A Dietary Assessment of the U.S. Food Supply

Information on how diets differ from Federal dietary recommendations is key to Federal efforts to monitor the dietary and nutritional status of the population. This study compares average diets for the 1970-96 period, as determined through food supply data, with Federal dietary recommendations depicted in the Food Guide Pyramid. Also, a method was devised to adjust the data for food spoilage and other losses incurred throughout the marketing system and the home. Because estimates of servings are derived from consumption data for raw and semi-processed agricultural commodities rather than for final food products, food servings can be readily converted back to farm-level data for establishing production and supply goals for farmers and the food industry.

Estimates were from the time-series food supply data compiled by the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS). Therefore, the data may be used as a baseline to project future trends in food demand and to compare these trends against the serving recommendations depicted in the Food Guide Pyramid.

Methods of Dietary Assessment

The Food Guide Pyramid is being used in a food-based approach that recognizes the link between diet and the risk of chronic disease. Food consumption data are assessed by using serving recommendations specified by the Food Guide Pyramid.

The food supply series estimates the quantity of food available for human consumption in the U.S. food marketing system by tracking commodity flows from production to end uses. Because it has continually measured food and nutrient availability since 1909, the food supply estimates are most often used as indicators of trends over time. These data also have limitations: the amount of food actually ingested by humans is overstated because nonedible food portions, waste and spoilage, and foods used as ingredients in processed foods that are exported are included in the estimates.

The Continuing Survey of Food Intakes by Individuals (CSFII) measures food eaten by individuals by recording food intake over a specific period—2 nonconsecutive days in the 1994-96 survey. Demographic data are also collected and allow researchers to assess dietary status among population groups. Food-intake surveys, such as the CSFII, that collect data on food consumption through recalls or food records are subject to underreporting—especially in terms of energy intake. These data allow researchers to compare the amount and types of foods available in the food supply with actual food intakes.

Translating Food Supply Data into Food Servings

A multistage process was used to convert aggregate estimates of the food supply into food servings comparable with those specified in the *Food Guide Pyramid* bulletin. Servings were estimated for more than 250 individual food commodities or commodity groups that were divided into the five major Pyramid food groups (grains, fruits, vegetables, dairy products, and meat/meat alternates) or separate groups for fats and oils and added sugars.

Annual per capita estimates of the food supply were then converted into daily servings and compared with the serving recommendations depicted in the Food Guide Pyramid. The food supply data were adjusted for spoilage and other waste. Depending on the commodity, several different types of losses were identified and estimated—included are retail and foodservice and consumer losses, changes in weight due to cooking, and the discard of nonedible food parts. Losses averaged 27 percent across all food groups, but rates varied between some food groups.

Single-serving weights were defined for each commodity in the food supply by using serving weights identified in USDA's Nutrient Data Base for Standard Reference. The selected food portion was the one that most closely resembled the serving size defined in the *Food Guide Pyramid* bulletin. Because some serving recommendations specified in the Food Guide Pyramid are product based, rather than ingredient based, serving weights for some foods were not consistent with standard serving sizes defined by dietary guidance.

Daily per capita consumption was divided by the assigned serving weight to calculate average servings for that commodity. Individual food servings were then summed to determine total daily servings for each Pyramid food group. The difference between the total number of daily servings for each food group provided by the food supply and

the serving recommendations reported in the Food Guide Pyramid was measured.[1]

Findings

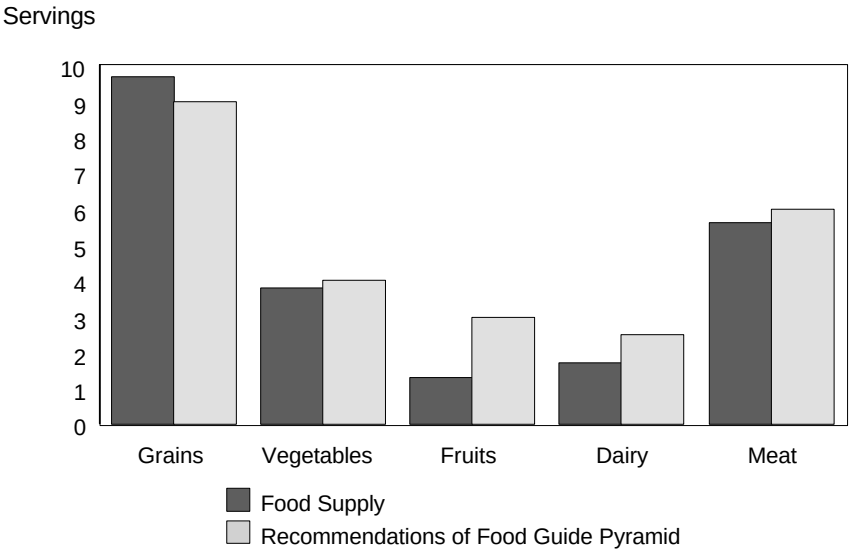
Estimated servings provided by the food supply for 1996 suggest that the average American diet is out of balance with serving recommendations depicted by the Food Guide (fig.1). Average consumption falls short of recommended servings for vegetables, fruits, dairy products, and meats. In 1996 the grains group is the only food group where total servings met recommendations for a 2,200-calorie diet.

Breads, cereals, rice, and pasta—In 1996 the food supply provided an estimated 9.7 daily servings of grain products, well within the 6-11 daily servings recommended for all Americans age 2 and older. Thus many individuals likely met the recommendation in the Food Guide Pyramid: 9 daily servings appropriate to a 2,200-calorie diet. In 1970 total daily servings of grain products numbered only 6.8. This suggests that many consumers are heeding nutrition education messages to increase their consumption of grain products.

Almost half of the increase in servings since 1970 can be attributed to higher consumption of white and whole-wheat flour, a twofold increase in durum flour (used for pasta) and corn products (used for snack chips and Mexican-style food

[1]The recommended servings used in this study were the midpoint of the recommended Pyramid servings for each food group, based on a sample diet of 2,200 calories. A 2,200-calorie diet was chosen as a standard because it approximates the daily Recommended Energy Allowance (REA) of 2,247 calories for the United States that is derived from a population-weighted average of REA's for different age and gender groups of the population.

Figure 1. For four food groups, servings from Food Supply were less than recommendations[1] specified by Food Guide Pyramid, 1996



[1]Recommended servings were the midpoint of the recommended Pyramid servings for each food group, based on a sample diet of 2,200 calories.

such as tortillas), and a threefold increase in rice consumption. Many grain products, however, are relatively high in fats, oils, and added sugars and contribute little in the way of fiber and micronutrients found in whole-grain breads, cereals, and other grain products. The CSFII servings data for 1996 confirm that consumption of foods made with whole grains—1 serving per day, on average—was well below dietary guidance recommendations.

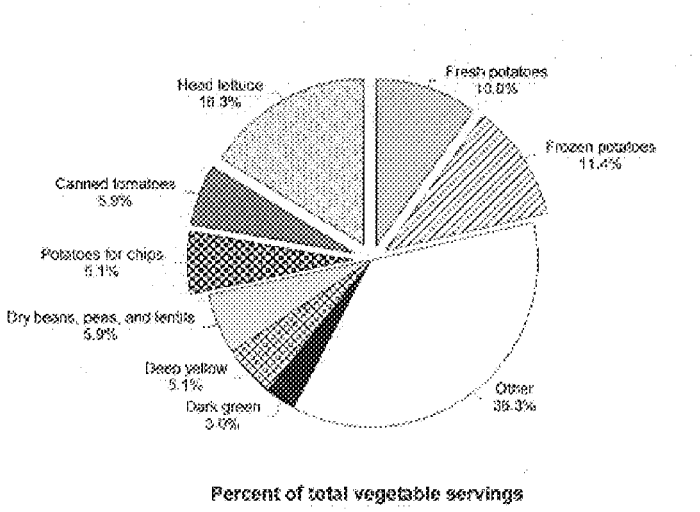
Vegetables—The food supply in 1996 provided a daily average of 3.8 servings of fresh, frozen, and canned vegetables, and dry beans, peas, and lentils—close to the 4 daily servings recommended for a 2,200-calorie diet. Between 1970 and 1996, average consumption grew by about 20 percent (half a daily serving of vegetables). Supporting documentation for the Food Guide Pyramid suggests that consumers should evenly divide their daily servings of vegetables among three vegetable subgroups: Dark-green leafy and deep-yellow, starchy (including dry beans, peas, and other lentils), and other vegetables. Further, the Food Guide Pyramid documentation suggests that for optimal health benefits, consumption would be evenly divided among these three subgroups, and dark-green leafy vegetables should average 0.6 servings each day.

In 1996, however, average consumption of vegetables was heavily weighted toward starchy vegetables, especially white potatoes. Consumption of these starchy vegetables suggests that consumers may not be incorporating adequate variety

into their daily choices of vegetables. Although the food supply for this group includes estimates for about 80 different vegetables, about half of the total servings of vegetables for 1996 were supplied by head lettuce, potatoes for freezing, fresh potatoes, potatoes for chips and shoestrings, and tomatoes for canning (fig. 2).

In 1996 the food supply provided one-tenth of a daily serving of dark-green leafy vegetables—less than one-quarter of the recommended daily servings. Broccoli and Romaine lettuce accounted for most of these servings. According to the 1996 CSFII, mean daily intake of dark-green leafy vegetables was about 0.2 servings, or about 6 percent of total vegetable servings. Thus both data sources report similar findings: consumers are not incorporating dark-green leafy vegetables into their daily vegetable choices.

Figure 2. Five foods accounted for half of total vegetable servings in 1996



Source: U.S. Department of Agriculture, Economic Research Service.

The food supply provided less than one-fourth of a daily serving of deep-yellow vegetables, about one-third of recommended servings. Most (more than three-quarters) servings of deep-yellow vegetables were some form of carrots.

The food supply provided more than the recommended servings of starchy vegetables, mostly white potatoes. However, average consumption of dry beans, peas, and lentils was one-third of recommended levels, with the food supply providing about one-quarter serving a day.

Fruits—The food supply in 1996 provided 1.3 servings per person per day of fresh and processed fruits and fruit juices, less than half the recommendations of the Food Guide Pyramid: 3 servings for a 2,200-calorie diet. The number of servings of fruit available from the food supply has increased about 20 percent since 1970, or about one-quarter of a serving.

Total servings of fruit were almost evenly divided between two subgroups—citrus, melons, and berries (0.6 servings) and other fruit (0.7 servings). About half of the total servings of fruit came from six foods—orange juice (18 percent), bananas (10 percent), fresh apples (8 percent), watermelon (6 percent), apple juice (6 percent), and fresh grapes (5 percent). It appears that consumers may not be incorporating adequate variety into their daily fruit choices.

Milk, Yogurt, and Cheese Group—Because dairy products supply 73 percent of the calcium in the food supply (and calcium is essential for the formation and maintenance of bones and teeth), requirements increase significantly for those in adolescence and early adulthood, as well as for women who are pregnant and lactating. Also, inadequate calcium intake appears to be an important risk factor for osteoporosis, a disease that weakens the body's bone structure and is responsible for more than 1 million fractures each year. As a result, the dairy group is the only food group for which serving recommendations specified by the Food Guide Pyramid are based on age and physiological status rather than on energy intake. Three servings are suggested for teenagers, young adults up to 24 years old, and pregnant or lactating women; 2 servings are recommended for children and most adults.

In this study, average servings were compared with a weighted average equivalent to 2.2 servings per day. In 1996, the food supply provided 1.7 servings of dairy foods, suggesting that most Americans are not meeting dietary recommendations. Total servings have remained nearly constant since 1970.

More than half of the dairy servings provided by the food supply in 1996 came from two dairy products that are naturally high in fat—cheese (38 percent)

and whole milk (16 percent). Reduced fat, 2-percent milk (15 percent), 1-percent milk (5 percent), and skim milk (16 percent) account for over one-third of dairy servings in the food supply.

Between 1982-86 and 1992-96, Americans reduced their consumption of whole milk by more than one-third, while nearly doubling their consumption of skim and 1-percent milk. During this period, there was a 20-percent increase in per capita cheese consumption, most of which is about as high in total and saturated fat per serving as whole milk. Thus consumers may be substituting one high-fat dairy product for another with little net reduction in total dairy fat intake.

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group (meat group)—The food supply provided the equivalent of 5.6 ounces of cooked meat per person per day, close to the recommended intake of 6 ounces for a 2,200-calorie diet. However, commodity data suggest that, on average, the food supply is providing larger quantities of foods (relative to others in the group) that are naturally high in fat, saturated fat, and cholesterol. Despite a 36-percent increase in servings of poultry since 1982-86, red meat (beef, veal, pork, and lamb) accounted for 52 percent of total meat equivalent servings in 1996, double the 27-percent poultry share. Fish and shellfish accounted for 7 percent; eggs, 9 percent; and peanut butter, 2 percent of the servings of the meat group.

The addition of dry beans, peas, and lentils to the meat group would increase total daily servings of the meat group from the food supply to 5.8 ounces. As previously stated, supplies of these foods are well below those needed to fulfill the vegetable group recommendation, and even further short of the combined quantity needed for the vegetable and meat requirements. Together with nuts and seeds, dry beans, peas, and lentils are naturally high in several vitamins and minerals that are present in relatively small quantities in animal products and seafood, making them a desirable low-cost, lowfat, and high-fiber alternative to meat, poultry, and fish.

The Pyramid Tip: Added Fats and Oils—The food supply provided 60 grams of added fats and oils[2] in 1996, up from the 56 grams available for consumption in 1982-86. Added fats and oils are those that are added in cooking, at the table, and by food manufacturers in many processed food products such as baked goods, French fries, snack foods, and peanut butter. In 1996, fat grams from added fats and oils alone accounted for 82 percent of the recommended upper daily limit of total fat intake—about 33 percent of total calories for a 2,200-calorie diet. The *1995 Dietary Guidelines* recommend that people limit total fat consumption to no more than 30 percent of daily energy intake—about 73 grams for a 2,200-calorie diet. Added fats and oils accounted for 52 percent of the total fat in the food supply in 1994, according to food supply nutrient data. This suggests that the quantity of added fats available for human consumption would have to decline by more than one-third to bring added fat consumption to 38 grams (73 grams of total fat x 0.52).

The Pyramid Tip: Added Sugars—The food supply data for added sugars and other caloric sweeteners measure the delivery of refined cane and beet sugar, corn sweeteners, and edible syrups to U.S. food and beverage manufacturers. Except for table sugar, the data do not measure the consumption of individual products. The food supply provided an average of 32 teaspoons of caloric sweeteners daily in 1996. This was more than two and one-half times the 12 teaspoons of added sugars suggested, in *The Food Guide Pyramid* bulletin, as an upper limit for a 2,200-calorie diet and 16 percent higher than the 27 teaspoons provided by the food supply in 1982-86.

Dietary guidance focuses on added sugars because foods high in added sugars often supply additional calories but few nutrients. To the extent that consumers substitute the calories from less nutrient-dense sugary snacks, sweetened soft drinks, and baked goods for nutrient-rich foods such as fruits, vegetables, and whole grains, their dietary intake of fiber, vitamins, and minerals found in less nutrient-dense foods may be reduced.

Estimates of the servings provided by the U.S. food supply reported here represent the first attempt to measure changes in food consumption over a continuous period by using the Food Guide Pyramid as a dietary assessment tool. Both this study and the CSFII for 1994-96, which estimated Food Guide Pyramid servings from food-intake data, conclude that most consumers have a long way to go to bring their diets closer to serving recommendations specified by the Food Guide Pyramid. The substantial differences in serving estimates for the two data sets for some food groups suggest the need for additional research to determine the reasons for these differences.

[2]These fats are consumed in addition to the naturally occurring fat in meat, fish, nuts, eggs, and dairy foods.

Source: Kantor, L.S., 1998, *A Dietary Assessment of the U.S. Food Supply*, Agricultural Economic Report No.772, U.S. Department of Agriculture, Economic Research Service.